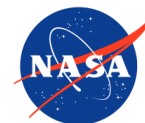





The “New” Commercial Space Market – Does it Exist?

Mark Davidson – Office of Technology Partnerships
Bank of America Merrill Lynch Aerospace Conference
New York - January 11, 2018



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NASA Vision and Mission

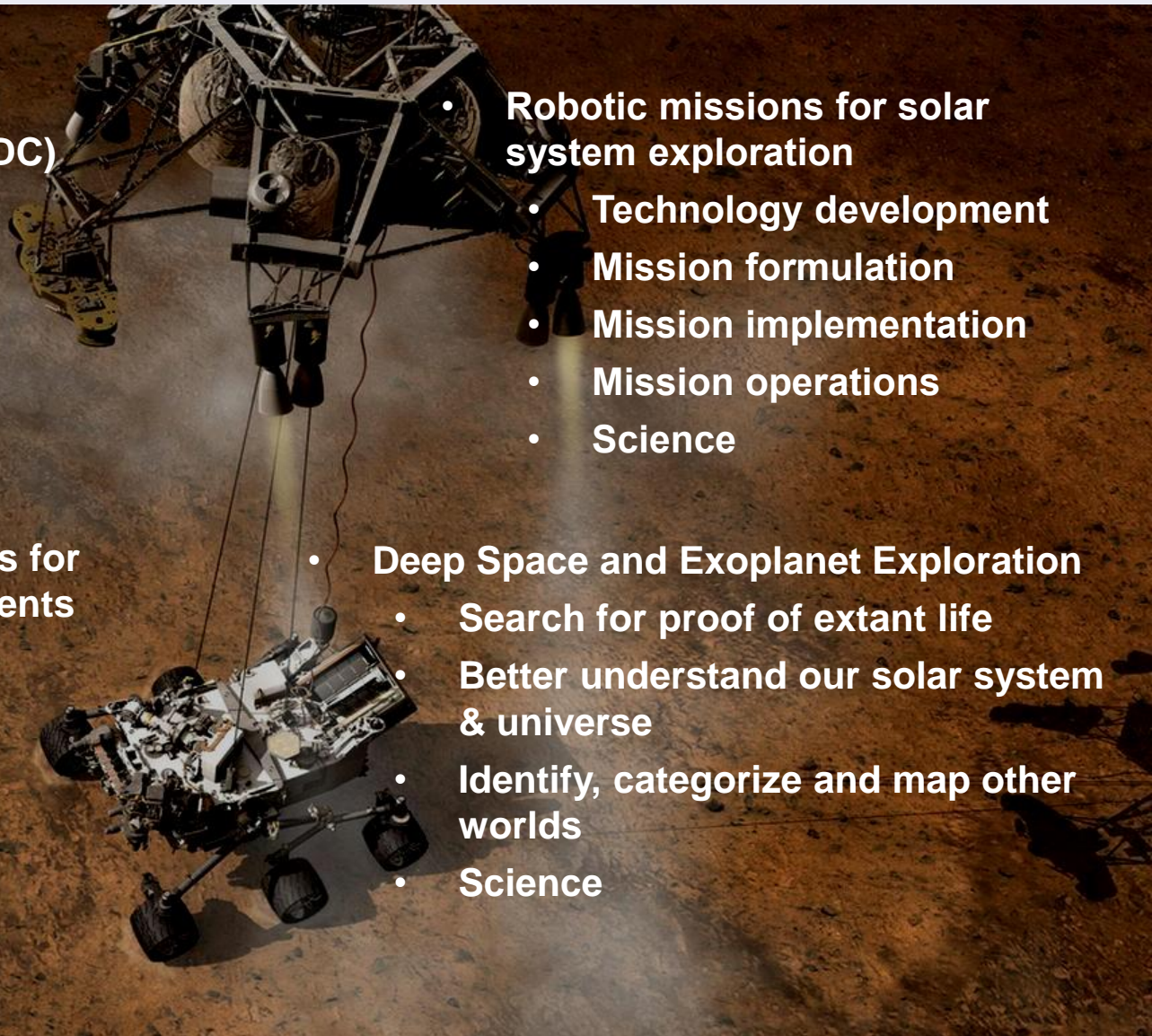
- 
- **NASA Vision:**
 - To improve life here;
 - To extend life to there;
 - To find life beyond.
 - **NASA Mission:**
 - To understand and protect our home planet;
 - To explore the universe and search for life;
 - To inspire the next generation of explorers as only NASA can.



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NASA's Jet Propulsion Laboratory



- **NASA-owned, Federally-Funded Research and Development Center (FFRDC)**
- **University operated under Prime Contract with NASA**
- **~ 5,000 employees**
- **Annual Budget ~ \$1.5B**
- **Robotic missions for solar system exploration**
 - **Technology development**
 - **Mission formulation**
 - **Mission implementation**
 - **Mission operations**
 - **Science**
- **Earth Observation missions for monitoring earth environments**
 - **Mapping**
 - **Carbon Monitoring**
 - **Ice and water**
 - **Climate / weather**
 - **Science**
- **Deep Space and Exoplanet Exploration**
 - **Search for proof of extant life**
 - **Better understand our solar system & universe**
 - **Identify, categorize and map other worlds**
 - **Science**



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National Laboratory's Technology Commercialization Paths

Expertise Transfer

JPL personnel often develop unique and advanced skills in a technical area through their work at the Laboratory, and then apply those skills to revolutionary commercial products and services

Commercial products and services may often be based on specific JPL technologies that have been published, disclosed, placed in the public domain, or not otherwise restricted for use by the commercial sector

Technology Transfer

Fully developed NASA technology, usually protected by by Patent or Copyright, is licensed to a commercial company

Company further develops a NASA JPL technology and eventually introduces a commercial product or service

That company may continue to return to JPL to license future advances and even fund commercial partnerships to further the technology

Commercial Partnerships

Companies come to JPL to sponsor a "reimbursable project" to do research and development work that requires JPL capabilities not otherwise available in the private sector

JPL develops a technology specifically for a commercial sponsor's need, in accordance with the Laboratory's mission

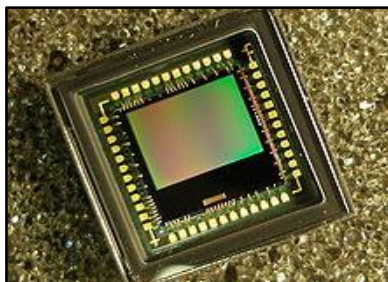
Commercial Partnerships can lead to licensing agreements for the new technology



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Commercial applications for JPL derived technology



Digital Cameras



**Database
Software**



Sunglasses



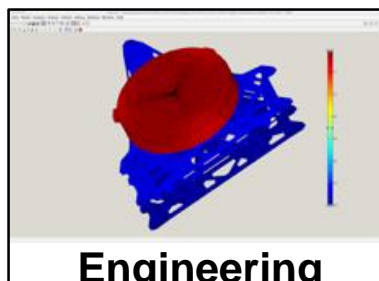
Cardiac Health



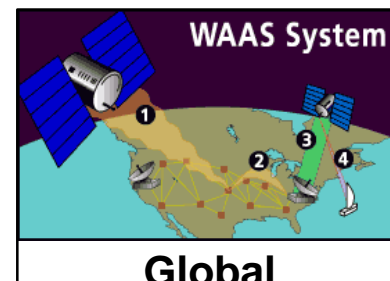
IR Thermometer



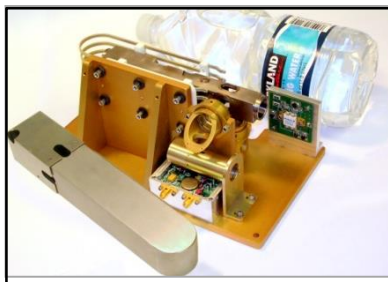
Fire Detection



**Engineering
Design Software**



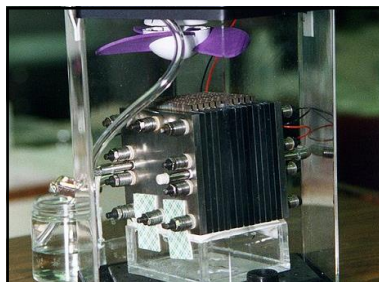
**Global
Positioning**



Precision Clocks



Robotic Surgery



Clean Energy



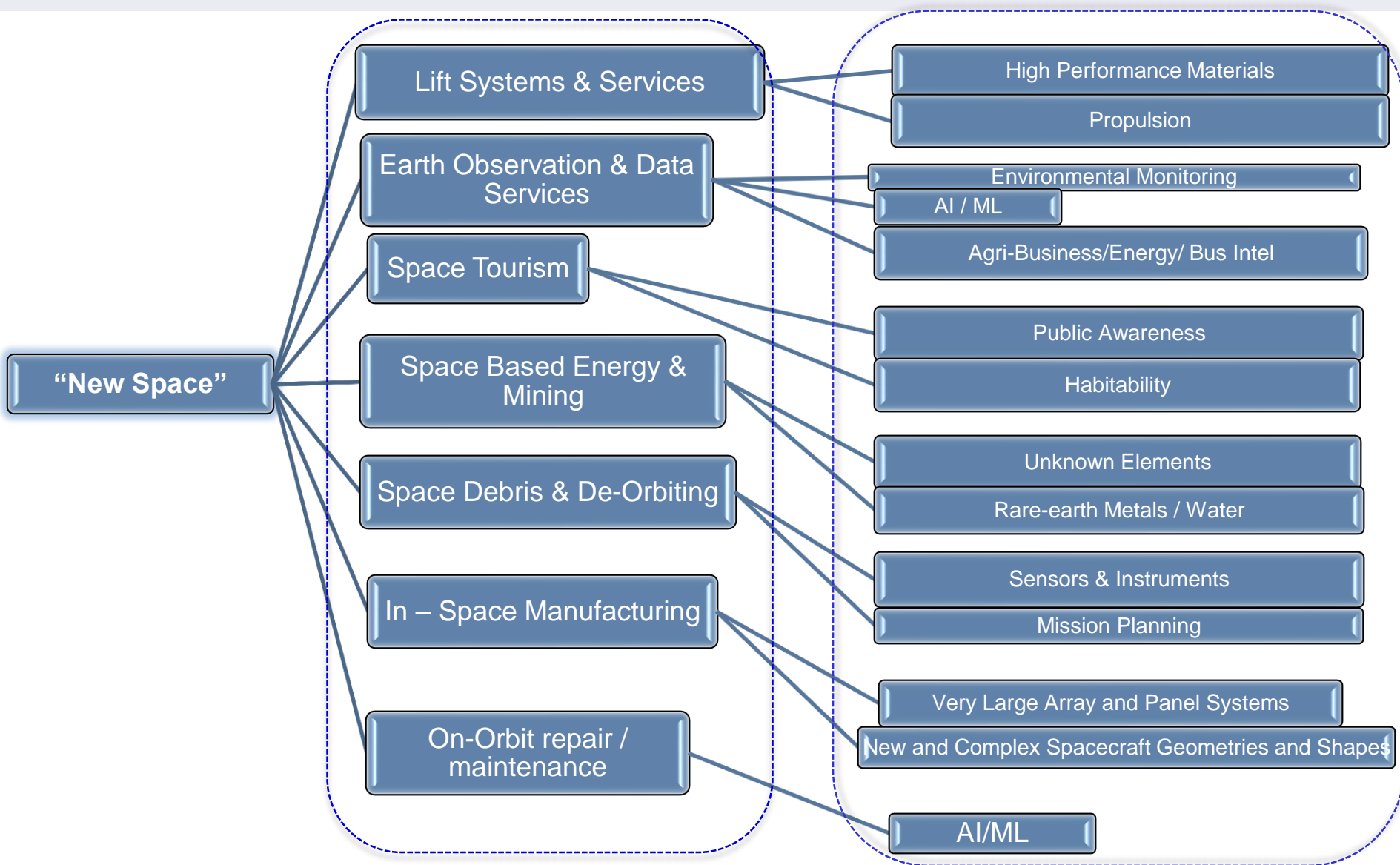
Mobile Robotics



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“New Space” Segmentation





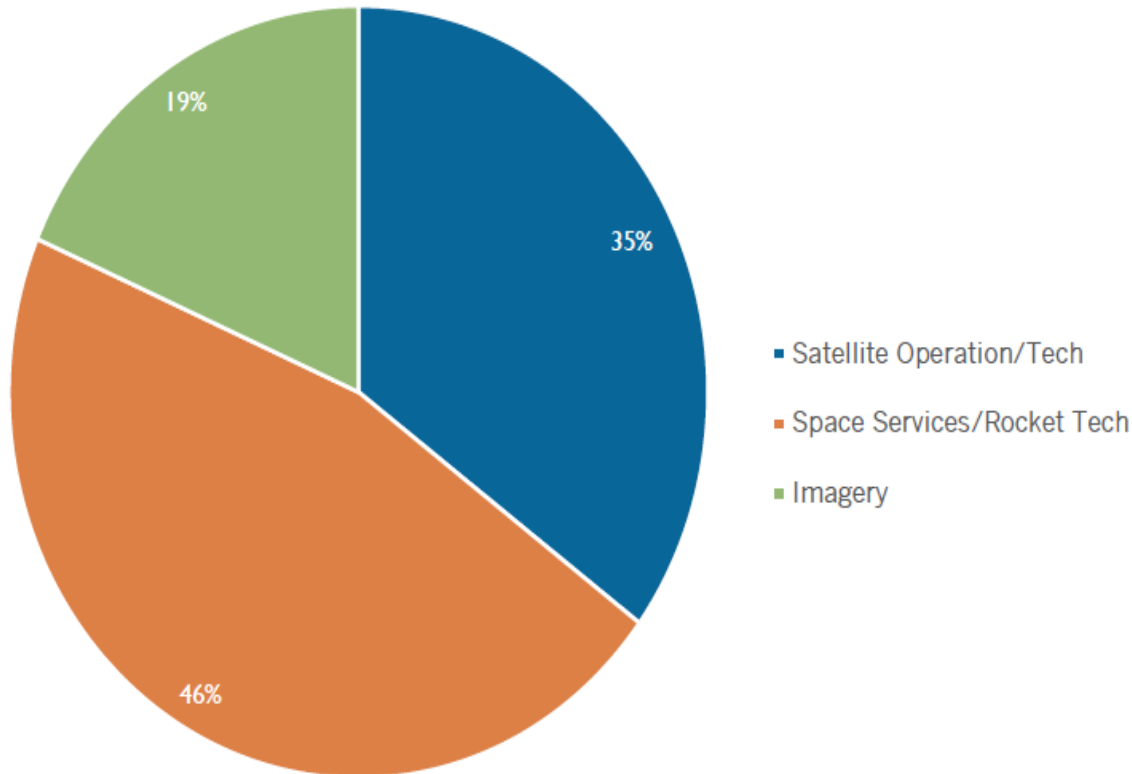
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Segment New Space Investments and Future Addressable Market

FUNDED SPACE COMPANIES BY FOCUS

As % of all funded companies, Q1'12 - Q2'15



- Since 2012 almost half of the funding has gone to lift and related space services
- Recent growth in small satellite startups focused on imagery and weather
- Imagery startups focused on data analytics and providing services to subscribers
- Future addressable market
 - > 2000 Small Sats projected to launch by 2020
 - Global commercial satellite imagery market of \$5b in 2019
 - 56% of Small Sats will be in commercial space through 2016



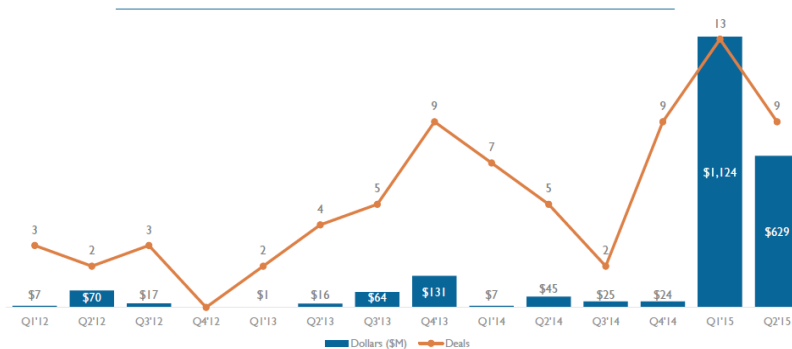
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Domestic Investments in New Space

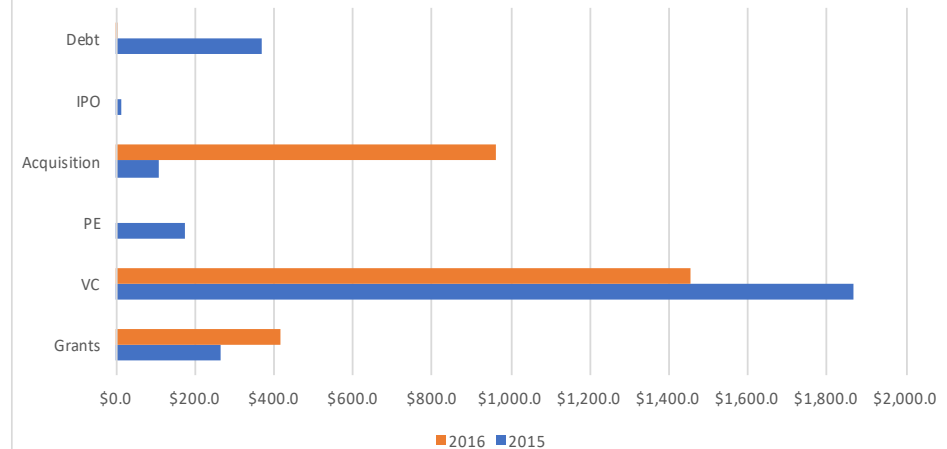
Space startups raised \$1.76B in the first half of 2015 as both funding and deal activity have increased in recent quarters. Mega-rounds to SpaceX (\$1B) and OneWeb (\$500M) have buoyed funding totals. Other notable financings in 2015 include Planet Labs' \$70M Series C, which valued the company at \$500M, Mapbox's \$50M Series B, and Spire's \$40M Series B.

SPACE INVESTMENT ACTIVITY Q1'12 - Q2'15



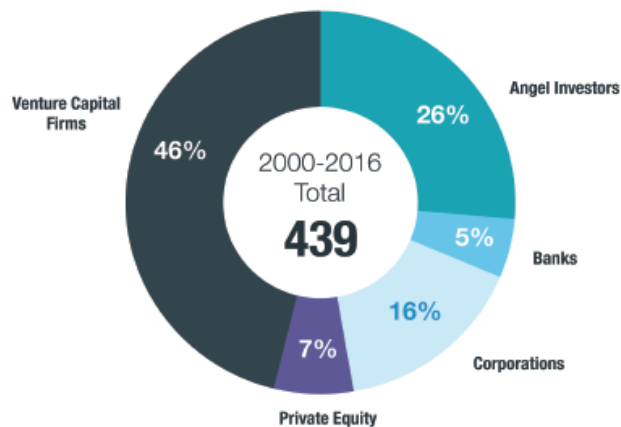
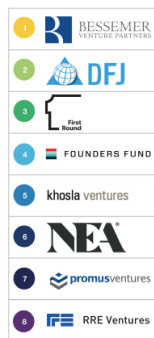
Data Source: CB Insights – "The Future of Frontier Tech" August 28, 2015

Recent Space Investments



Data Source: Bryce space & technology "Start Up Space" 2017

Number of Investors by Type from 2000 to 2016



Data Source: Bryce space & technology "Start Up Space" 2017

- 2015 – 2016 activity led by Space X placements
 - > \$1.5 billion
- Look also to international / government supported activity
 - India, Japan, EU (ESA), China
- While number and dollar volume has increased in the past 10 years, it had a low starting point when compared to other segments



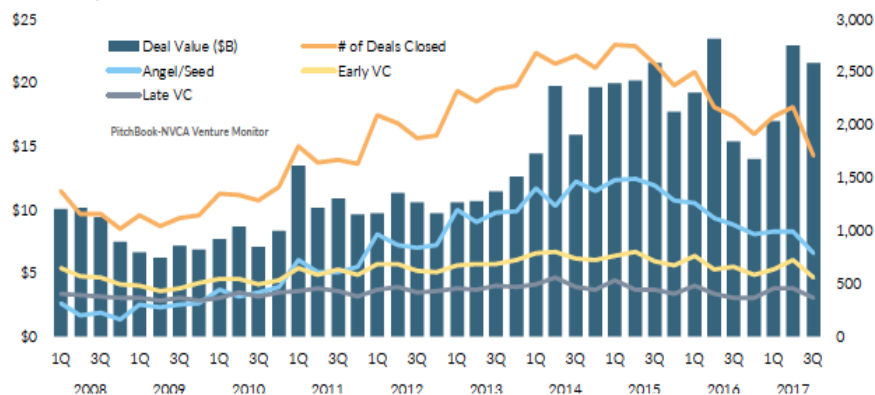
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2017 Domestic VC Activity

More than \$20B invested in each of past two quarters

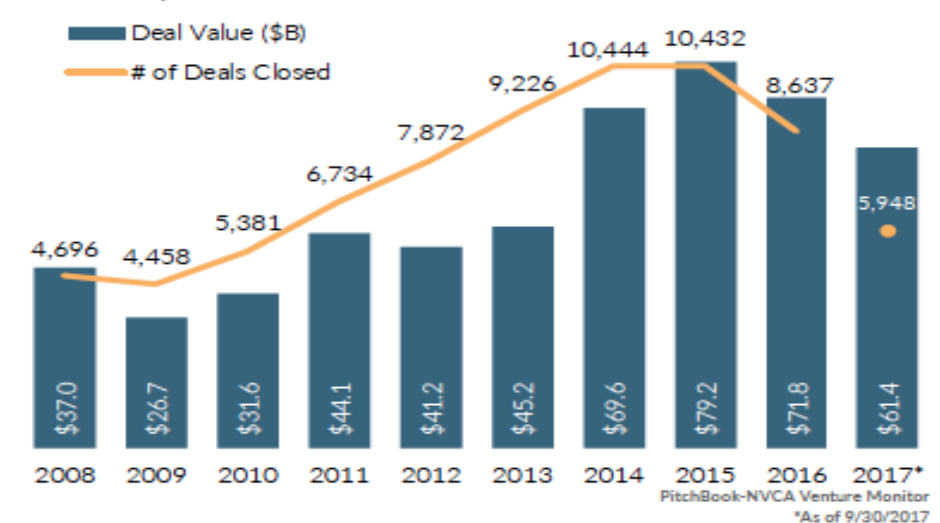
US VC activity



Source: CB Insights – “The Future of Frontier Tech” August 28, 2015

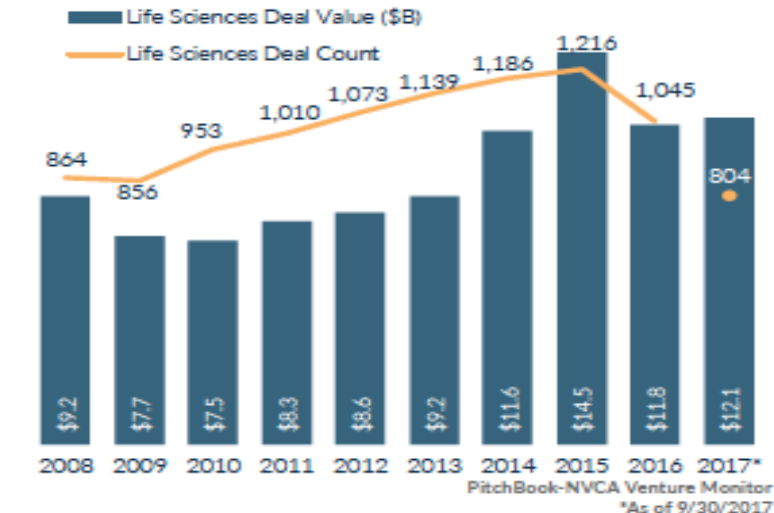
2017 pacing for record year in deal value

US VC activity



Life sciences set for record 2017

US VC activity (#) in life sciences



- 2017 on pace for > \$ 80 billion in VC deal value
- VC participation up 40% over last 10 years
- Recent most active segments
 - Artificial Intelligence > \$2.1 billion
 - Health Care
 - Biotechnology

Data Source: NVCA 3Q 2017 “PitchBook” Venture Monitor



- Life Science, led by health care, is attracting largest share of VC funding
 - Driven by aging western demographic
 - Integrating AI / ML into health diagnostic capability
- AI impact on logistics and transportation
 - Autonomous vehicles
 - Autonomous warehouses
 - "Autonomous Amazon" ? ? ?
- What about "old space"?
 - ULA / BA / LMT / MDA – SSL / NOC (+ ORB) . . .
- Lift is the long pole in the tent
- Dearth of start up Space Ports
- Small Sats are a commodity
- Value is in the data analytics and GSI
- New Space will grow – soon
 - International market
 - Will be highly competitive
 - AI / ML will be major contributors
- Buy Side in New Space?
- When will Sell Side start to publish notes on New Space?

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